

1 **In the Claims:**

2 Claims 1-22 were pending at the time of the Office Action.

3 Claims 1-22 are rejected.

4 No claims are amendeded or canceled by the current response.

5 Accordingly, claims 1-22 remain pending, and, for the sake of convenience  
6 are provided in a complete list of claims as follows:  
7

8  
9 1. (Original) A machine-readable medium having a data structure  
10 stored thereon for efficiently ordering a plurality of entities, each entity having a  
11 rank within a plurality of ranks, the data structure comprising:

12 a horizontally linked list linking at least a subset of the plurality of entities  
13 in at least a descending rank order direction, each entity in the horizontally linked  
14 list having a unique rank as compared to the ranks of other entities in the  
15 horizontally linked list; and,

16 an array having a plurality of array entries over which the plurality of ranks  
17 are distributed such that each array entry has a corresponding range of ranks, at  
18 least one array entry each pointing to an entity of the plurality of entities having a  
19 greatest rank within the corresponding range of ranks for the array entry.

20  
21 2. (Original) The medium of claim 1, the data structure further  
22 comprising at least one vertically linked list, each vertically linked list linking in at  
23 least one direction a corresponding subset of the plurality of entities having an  
24 identical rank.  
25

1           3.     (Original)    The medium of claim 2, wherein each vertically linked  
2 list links the corresponding subset of the plurality of entities in a first vertical  
3 direction and a second vertical direction.

4  
5           4.     (Original)    The medium of claim 1, the data structure further  
6 comprising a head pointer pointing to an entity having a greatest rank of the  
7 plurality of ranks of the plurality of entities.

8  
9           5.     (Original)    The medium of claim 1, wherein the horizontally  
10 linked list further links at least the subset of the plurality of entities in an  
11 ascending rank order direction.

12  
13           6.     (Original)    The medium of claim 1, wherein the plurality of ranks  
14 are equally distributed over the plurality of array entries.

15  
16           7.     (Original)    The medium of claim 1, wherein the entity having the  
17 greatest rank within the corresponding range of ranks for each of one or more of  
18 the at least one array entry is one of a subset of the plurality of entities having the  
19 greatest rank within the corresponding range of ranks for the array entry.

20  
21           8.     (Original)    The medium of claim 1, wherein at least one array  
22 entry of the plurality of array entries each points to null, corresponding to no entity  
23 within the plurality of entities having a rank within the corresponding range of  
24 ranks for the array entry.

25

1           9.     (Original)    The medium of claim 1, wherein each entity of the  
2 plurality of entities is a thread, the rank of the entity is a priority for the thread,  
3 and the array is a priority queue.

4  
5           10.    (Original)   A method for removing a particular entity from a  
6 plurality of entities, each entity having a rank within a plurality of ranks, the  
7 method comprising:

8               in response to determining that the particular entity is present within a  
9 vertically linked list linking in at least one direction a corresponding subset of the  
10 plurality of entities having an identical rank, the corresponding subset including  
11 the particular entity, delinking the particular entity from the vertically linked list;

12               in response to determining that the particular entity is present within a  
13 horizontally linked list linking at least a subset of the plurality of entities in at least  
14 in a descending rank order direction, the subset including the particular entity,  
15 delinking the particular entity from the horizontally linked list; and,

16               in response to determining that an array entry of a plurality of array entries  
17 of an array over which the plurality of ranks are distributed points to the particular  
18 entity, adjusting the array entry to point to one of null and another one of the  
19 plurality of entities.

20  
21           11.    (Original)   The method of claim 10, wherein the array entry has a  
22 corresponding range of ranks, and adjusting the array entry to point to one of null  
23 and another one of the plurality of entities comprises, in response to determining  
24 that the particular entity was present within the vertically linked list, adjusting the  
25 array entry to point to a next entity within the vertically linked list.

1  
2 12. (Original) The method of claim 11, wherein adjusting the array  
3 entry to point to one of null and another one of the plurality of entries further  
4 comprises, otherwise, in response to determining that the particular entity was  
5 present within the horizontally linked list, and that the rank of a next entity within  
6 the horizontally linked list is within the corresponding range of ranks for the array  
7 entry, adjusting the array entry to point to the next entity within the horizontally  
8 linked list.

9  
10 13. (Original) The method of claim 12, wherein adjusting the array  
11 entry to point to one of null and another one of the plurality of entries further  
12 comprises, otherwise, adjusting the array entry to point to null.

13  
14 14. (Original) The method of claim 10, further comprising, in  
15 response to determining that a head pointer pointing to an entity having a greatest  
16 rank of the plurality of ranks of the plurality of entities points to the particular  
17 entity, adjusting the head pointer to point to another one of the plurality of entities.

18  
19 15. (Original) The method of claim 14, wherein adjusting the head  
20 pointer to point to another one of the plurality of entities comprises, in response to  
21 determining that the particular entity was present within the vertically linked list,  
22 adjusting the head pointer to point to a next entity with the vertically linked list.

23  
24 16. (Original) The method of claim 15, wherein adjusting the head  
25 pointer to point to another one of the plurality of entities comprises, otherwise, in

1 response to determining that the particular entity was present within the  
2 horizontally linked list, adjusting the head pointer to point to a next entity within  
3 the horizontally linked list.

4  
5 17. (Original) The method of claim 10, wherein each entity of the  
6 plurality of entities is a thread, the rank of the entity is a priority for the thread,  
7 and the array is a priority queue.

8  
9 18. (Original) The method of claim 10, wherein the method is  
10 performed by execution of a computer program stored on a machine-readable  
11 medium by a processor.

12  
13 19. (Original) A method for adding a new entity having a rank within  
14 a plurality of ranks to a plurality of entities also each having a rank within the  
15 plurality of ranks, the method comprising:

16 of a plurality of array entries of an array over which the plurality of ranks  
17 are distributed such that each array entry has a corresponding range of ranks,  
18 determining the array entry having the corresponding range of ranks in which the  
19 rank of the new entity lies;

20 adjusting the array entry having the corresponding range of ranks into  
21 which the rank of the new entity lies to point to the new entity in response to  
22 determining that the array entry currently points to null;

23 adjusting the array entry having the corresponding range of ranks into  
24 which the rank of the new entity lies to point to the new entity in response to  
25

1 determining that the array entry current points to an entity having a rank less than  
2 the rank of the new entity;

3 linking the new entity into a vertically linked list linking in at least one  
4 direction a corresponding subset of the plurality of entities having an identical  
5 rank, in response to determining that the rank of the new entity is equal to the rank  
6 of any other entity within the plurality of entities; and,

7 otherwise, linking the new entity into a horizontally linked list linking at  
8 least a subset of the plurality of entities in at least a descending rank order  
9 direction, each entity in the horizontally linked list having a unique rank as  
10 compared to the ranks of other entities in the horizontally linked list.

11  
12 20. (Original) The method of claim 19, further comprising adjusting  
13 a head pointer pointing to an entity having a greatest rank of the plurality of ranks  
14 of the plurality of entities to point to the new entity in response to determining that  
15 the rank of the new entity is greater than the rank of the entity of the plurality of  
16 entities to which the head pointer currently points.

17  
18 21. (Original) The method of claim 19, wherein each entity of the  
19 plurality of entities is a thread, the rank of the entity is a priority for the thread,  
20 and the array is a priority queue.

21  
22 22. (Original) The method of claim 19, wherein the method is  
23 performed by execution of a computer program stored on a machine-readable  
24 medium by a processor.  
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